

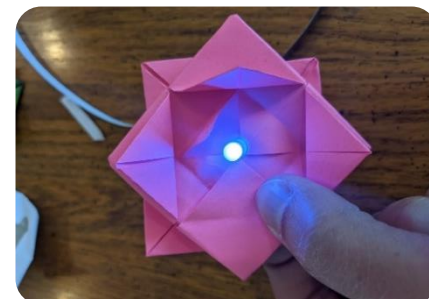
TAKE AND MAKE: Origami Circuits

Visit here for a tutorial video and more: <https://tinyurl.com/bdzfrezx>



What are paper circuits?

Paper circuits are a great introduction to basic circuitry that use conductive tape, LEDs, and batteries to make light-up cards, origami, signs, and more. In this project, you'll learn how to fold a paper lotus flower and a paper butterfly that you can make light up using the supplies provided.



What is in this Take and Make?

In this bag, you will find three sheets of origami paper, 1 watch battery, 3 LEDs, 2 ft of conductive tape, and instruction sheets showing you how to fold a light-up origami lotus and butterfly.

Forming a Circuit

"Electric circuits are paths for transmitting electric current, or moving electricity. An electric circuit has to have a power source, wires for the electricity to flow through, and a device such as a lamp or a motor that uses the electric current. All of these parts must be connected so that the current continues to flow."

- Electric Circuit." *Britannica Student Encyclopedia: An A to Z Encyclopedia*, Encyclopaedia Britannica, 2015. *Gale In Context: Elementary*.



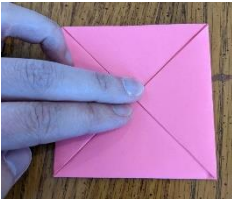

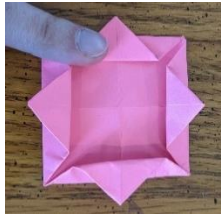
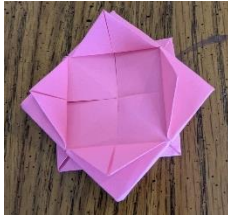
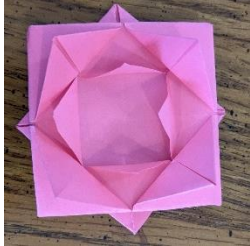
In this project, the power source is the watch battery, the wires are the conductive tape, and the device is the LED. When the ends of the LED are connected to the battery with conductive tape, the light will turn on. Once you are comfortable with the process described in the projects below, you can make all sorts of papercrafting projects with simple circuits!

Resources for Exploring Paper Circuits at PPLD:

- [30-Minute Robotic Projects](#) by Loren Bailey.
- [LED Light-Up Card Project: https://ppld.org/tween-twist-light-led-cards](https://ppld.org/tween-twist-light-led-cards)

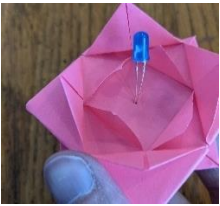
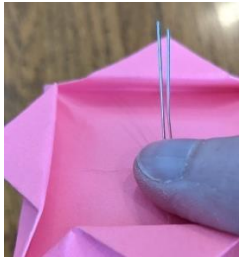
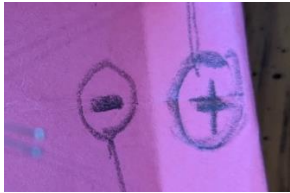


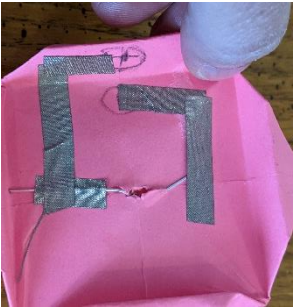
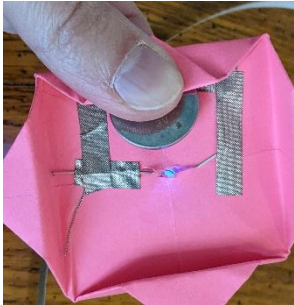
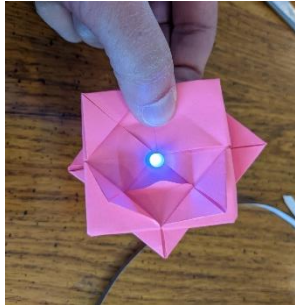
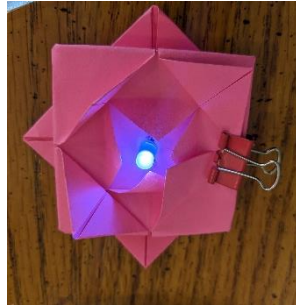
Origami Lotus Instructions

<p>Place the paper flat on the table.</p>	<p>Fold the top right corner to the bottom left corner and crease.</p>	<p>Unfold and fold the top left corner to the bottom right corner. Crease.</p>	<p>Unfold, then fold the bottom right corner to the center of the paper. Crease.</p>	<p>Fold the other three corners into the center of the paper. You will have a smaller square.</p>

				
Now do the same thing again: fold all four corners into the center of the square.	Flip the paper upside down and repeat: fold all four corners into the center of the square.	Fold each of the four corners back halfway, so that the tip pokes out past the edge of the paper.	Flip back to the other side. To form the petals, fold all the flaps at the halfway point and crease so they stick up.	This will reveal the layer underneath. Fold those flaps at the halfway point as well and crease.

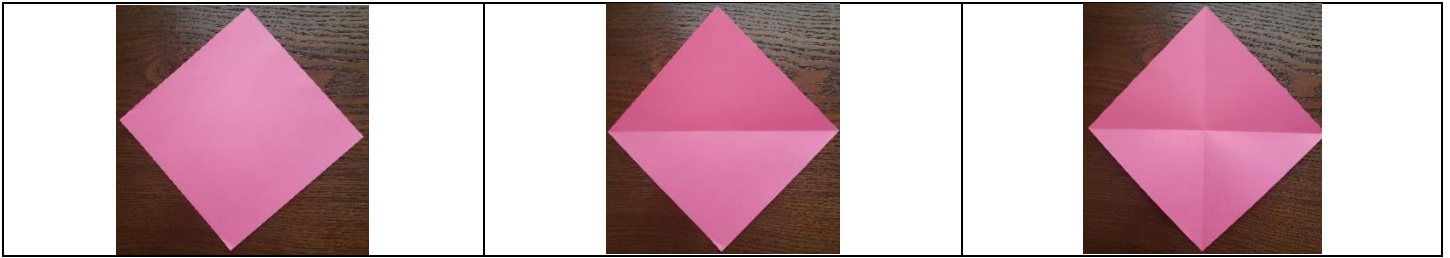
Congratulations, you have folded a lotus flower! Now we just need to add the circuit so that it can light up.

Adding the Circuit:

				
Take the LED and poke the pointy ends down through the center of the flower so that the light is in the middle.	Now turn the flower upside. The short end of the LED is the negative end. The long end is the positive end.	Draw a circle under one of the flaps and put a negative sign on it. Draw another circle on the fold above it and put a positive sign on it.	Draw a line from the negative circle to one side of the LED and a line from the positive circle to the opposite side of the LED.	Tape the short end of the LED to the negative line. Place tape strips along the lines you drew connecting the short end to the negative circle you drew.
				
Tape the long end to the positive line. Place tape strips connecting it to the positive circle you drew.	Place the battery under one of the corner folds with the positive side lined up with positive marker and the negative side lined up with the negative marker.	When you close the flap, it presses the battery to the conductive tape and closes the circuit. The LED will light up.	To hold it closed, you can use a paperclip or binder clip. When you want to turn it off, remove the clip.	Once you are comfortable with forming a simple circuit, you can apply this to all sorts of paper projects!

Folding an Origami Butterfly (adapted from <https://makeprojects.com/project/light-up-origami-butterfly>)

Start by placing your piece of origami paper flat with one of the corners pointing up. Fold the top corner down to meet the bottom corner. Rotate the paper 90 degrees and repeat the top-to-bottom fold.



Fold the top point down to the middle. Repeat on all sides, then unfold and turn the paper over.



With your paper laying with a side edge up, fold the top edge to the middle. Repeat with the bottom. Rotate the paper 90 degrees and repeat both folds.




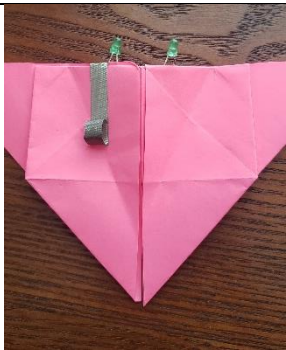
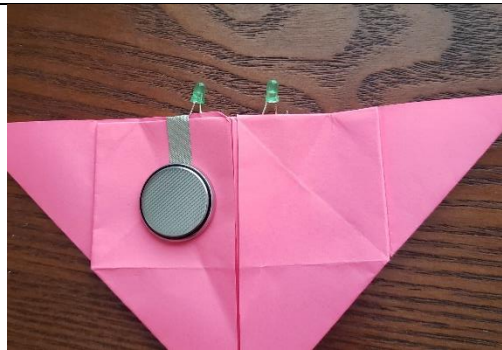



Open the top folds. Lift a point near the center and fold it downward, reversing the folds and aiming the points outward and to the sides. Repeat on the bottom. The result is a six-sided shape. Rotate the paper and fold the points outward and down to the sides along the diagonal creases. Flip over.



Fold the top down to meet the bottom of the square. Fold the right side over along the middle, creating a triangle. Holding at the right angle of the triangle, fold the points upward and out, creating wings. The center should be wider at the top and come to a point about halfway down the body.



Adding the Circuit:

		
<p>Lay the butterfly flat. With the positive lead (the longer one) to the left, tape one LED to the left side of the butterfly. Use the maker tape on each lead, making sure that the positive and negative ends do not touch. Tape the right LED down in the same way, this time ensuring that the positive lead is to the right.</p>	<p>Wire the positive LED by attaching a piece of maker tape to the positive lead of the right LED and wrapping it around to the back of the butterfly. Fold a piece of tape into a loop with the sticky side facing out. Place that on the tape you added to the back.</p>	<p>Use the sticky loop of tape to attach the watch battery to the circuit, positive side down.</p>
		
<p>Wire the negative LED by attaching a piece of maker tape to the negative lead of the left LED and around to the back of the butterfly. Folding carefully, direct the tape to the negative side of the battery, being sure not to cross over any of the positive circuitry.</p>	<p>Pinch the wings of the butterfly back together to complete the circuit and turn on the LED lights.</p>	<p>If it doesn't work right away, be sure that your led leads are taped down far enough away from each other that they don't overlap and that the positive end touches the positive end and the negative the negative. Also make sure that the battery is sticking down firmly.</p>